Course Name: Forest Surveying

Course Number: FE 208 (every Fall)

Course Credits: 4 credits; MWF 1-hour lecture, 1-hour computer lab, plus 3-hour field lab

Prerequisite: Trigonometry (MTH 112 or MTH 241 or MTH 251 or MTH 252).

Learning Resources:
Elementary Surveying: An Introduction to Geomatics. Paul R. Wolf and Charles G. Ghilani. 2006. Prentice Hall, New Jersey. This text is strongly recommended for those students who intend to take the Fundamentals of Land Surveying exam but is not required. There is a newer edition of this text (2012), but the chapters are organized similarly.

Course WWW site: http://www.cof.orst.edu/cof/teach/fe208/

Lecture Notes: Lecture outlines are available at the WWW site listed above. The outlines are provided for your convenience. Please print them out prior to class and bring them with you for lecture. I will let you know which lecture outlines to bring to class.

Additional Reading: Surveying for Forestry and the Natural Resources- Kiser
Readings on file in the SLC and in the Konnie Lab
Elementary Forest Surveying and Mapping – Wilson
Elementary Forest Surveying and Mapping II – Wilson

Materials: Required
Hardhat – (a hardhat will be made available to you if you don’t have one)
Handheld scientific calculator – (bring to all tests)
Transit style field notebook (2)
Field boots

Optional
Level style field notebook (1)
Engineer’s scale
Field survey vest

Personal lockers: Personal lockers are available from the instrument room free of charge (unless you lose the key).
The Sequence of Surveying and Measurements Courses:
FE 208 is one course from an integrated sequence of four courses in Forest Surveying and Measurements (FE 208, 209, 310, and 311) and is an introduction to the theory and practice of surveying methods and measurements as applied to the specifics of forestry problems and their solutions. It provides fundamental instruction for surveying and field measurements, and is also intended to prepare forest engineering students for Forest Route Surveying, Advanced Forest Surveying, and Survey Law (CE 465).

This sequence of courses and FE 257 (GIS Applications in Forest Engineering) is designed to prepare students for the Fundamentals of Land Surveying exam which is necessary to become a Professional Land Surveyor.

Course Goals:
There are two primary goals for this course. The first is to learn and become proficient in basic forest survey techniques including surveying fundamentals, field notes, distance and angle measurements, and leveling techniques. The second goal, which is consistent throughout all Forest Surveying and Measurement courses, is the development and application of good professional practices.

Student Learning Outcomes:
The course objectives are built around lecture and lab combinations. Material presented in lecture will focus on the theory of surveying measurements and the application of surveying techniques to forestry related problems. The field labs will focus on the hands-on use of equipment, proper field measurement techniques, proper field note keeping, and the application of classroom material in forest field conditions.

Students who successful complete this course will be able to:

- Apply the theory of measurement errors.
- Solve surveying problems of horizontal distance, vertical distance, and angular measurement.
- Demonstrate the principles of map creation and projection, and use maps to solve problems of measurements and legal descriptions.
- Describe the concepts and development of the Public Land Survey System in the United States and Oregon, and use these concepts to accurately analyze and solve problems of division of public lands.
- Demonstrate proficient in a variety of field survey techniques and field note-keeping.
- Apply the concept of survey order.
Instructor’s Course Policies:

1. All assignments are due by the time and date assigned.

2. To receive credit, assignments must be turned in on time. Late assignments will not be accepted.

3. All work must be neat, legible, and complete. All steps should be shown. Sample calculations and a summary table may be used to illustrate repetitive calculations. Use words to explain the computations where necessary. Use sketches and drawings where required or helpful. Incomplete, undocumented work is unacceptable.

4. All figures, drawings, and tables should be titled.

5. There will be no make-up exams or quizzes.

6. Any requests for deviations in the course policies, schedule, or deadlines must be made in writing to the instructor. These requests should be made in the form of a typed business style letter that clearly states and defends your request. E-mail is acceptable but should be confirmed as having been received.

Grading:

Final grades for the course will be based on the following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Total points</th>
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<tbody>
<tr>
<td>Labs (7)</td>
<td>140</td>
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<tr>
<td>Lab Final</td>
<td>40</td>
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<tr>
<td>Quizzes (2)</td>
<td>20</td>
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<tr>
<td>Midterm Exams (2)</td>
<td>200</td>
</tr>
<tr>
<td>Final Exam (2)</td>
<td>100</td>
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<tr>
<td>Totals</td>
<td>500</td>
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Statement Regarding Students with Disabilities
"Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."

Link to Statement of Expectations for Student Conduct, i.e., cheating policies
http://oregonstate.edu/studentconduct/code/index.php#acdis
# FE 208 Course Outline

## Week 1

| Lecture: | Introduction to the course (Lecture 1 notes)  
Field notes & notekeeping  
Measurement errors (Lecture 2 notes) |
| Lab: | No lab |
| Reading: | Introduction W&G chap. 1  
Units and significant figures W&G chap. 2 part I  
Survey field notes W&G chap. 2 Part II  
Theory of errors in observations W&G chap. 3 |
| Supplemental reading: | Pafford, pages 1-87.  
Horizontal distance, Wilson pp. 30-34. |

## Week 2

| Lecture: | Horizontal distance (Lecture 3 notes)  
Taping specifications (Lecture 4 notes) |
| Quiz: | **Q1 – Measurement error (Friday)** |
| Lab: | Introduction to equipment room  
Field book setup and field book lab  
Pacing and measurement error (field)  
Compass navigation |
| Reading: | Distance measurement:  
Methods W&G chap. 6, Part I  
Taping W&G chap. 6, Part II |
Horizontal distance, Wilson pp. 22-29.  
Pafford, pp. 84-87 |

## Week 3

| Lecture: | Angles, bearings, and azimuths (Lecture 5 notes)  
The compass (Lecture 6 notes) |
| Lab: | Horizontal traverse measurements (field)  
Steel tape methods |
| Reading: | Angles, azimuths, and bearings W&G chap. 7 |
Pafford, pp. 90-95 |
<table>
<thead>
<tr>
<th>Week 4</th>
<th>Lecture:</th>
<th>Leveling 1 / Elevation Measurements (Lecture 7 notes)</th>
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<tbody>
<tr>
<td>Quiz:</td>
<td></td>
<td>Q2 – <em>Angles and bearings (Friday)</em></td>
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<tr>
<td>Lab:</td>
<td></td>
<td>Area layout with staff compass (field)</td>
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<tr>
<td>Reading:</td>
<td></td>
<td>Leveling- theory, methods, and equipment W&amp;G chap. 4</td>
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<thead>
<tr>
<th>Week 5</th>
<th>Lecture:</th>
<th>Differential leveling (Lecture 8 notes) Leveling errors (Lecture 9 notes)</th>
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</thead>
<tbody>
<tr>
<td>Exam:</td>
<td></td>
<td><em>Midterm 1 (Friday)</em></td>
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<tr>
<td>Lab:</td>
<td></td>
<td>Profile leveling with laser range finder &amp; tape/clinometer (field)</td>
</tr>
<tr>
<td>Reading:</td>
<td></td>
<td>Leveling- field procedures and computations W&amp;G chap. 5</td>
</tr>
<tr>
<td>Supplemental reading:</td>
<td></td>
<td>Pafford, pp. 105</td>
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<thead>
<tr>
<th>Week 6</th>
<th>Lecture:</th>
<th>Leveling adjustments (Lecture 10 notes)</th>
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<tbody>
<tr>
<td>Lab:</td>
<td></td>
<td>Closed traverse differential leveling (field)</td>
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<tr>
<th>Week 7</th>
<th>Lecture:</th>
<th>Traverse I (Lecture 11 notes) Traverse computations and adjustments (Lecture 12 notes)</th>
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</thead>
<tbody>
<tr>
<td>Lab:</td>
<td></td>
<td><em>Field exam (field)</em></td>
</tr>
<tr>
<td>Reading:</td>
<td></td>
<td>Traverse computations W&amp;G chap. 10 Area W&amp;G chap. 12</td>
</tr>
</tbody>
</table>
| Week 8 | Lecture: | Traverse Area & coordinate computations (Lecture 13 notes)  
         |         | Public land survey system (Lecture 14 notes)  
         | Exam:   | Midterm 2 (Friday)  
         | Lab:    | Mapping and GPS (field) (meet in Peavy 240)  
         | Reading: | Surveys of the public lands W&G chap. 22  
         |         | Mapping W&G chap. 17  
         |         | Photogrammetry W&G chap. 27 pp. 786-806  

| Week 9 | Lecture: | Maps and mapping (Lecture 15 notes)  
         |         | Map projections, coordinate systems, and datums  
         |         | No class on Friday  
         | Lab:    | Digital total station (field)  
         | Reading: | Control Surveys W&G chap. 19  
         |         | GPS W&G chap. 13 & 14  
         |         | W&G 13th Edition (2012) see also chap. 15 for GPS  
         | Supplemental reading: | GPS The next Utility SLC # 9  

| Week 10 | Lecture: | Survey control (Lecture 16 notes)  
          | Lab: | No lab  

| Week 11 | FINAL EXAM | (See online Schedule of Classes.)  
         |         |  

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FE 208 - Reading List


